

FIGURE 1

ON-BOARD PROGNOSTIC INSTRUMENT ENGINEER (OPIE)

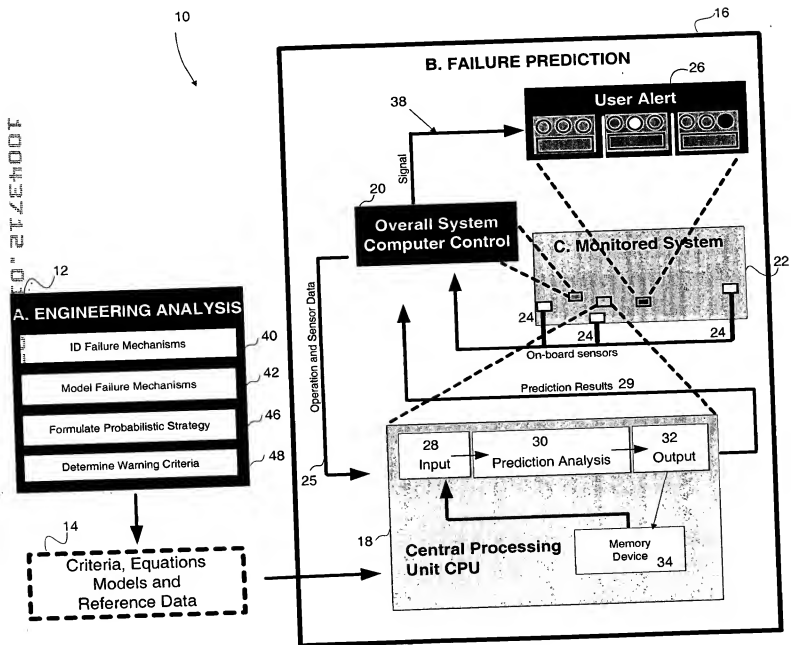
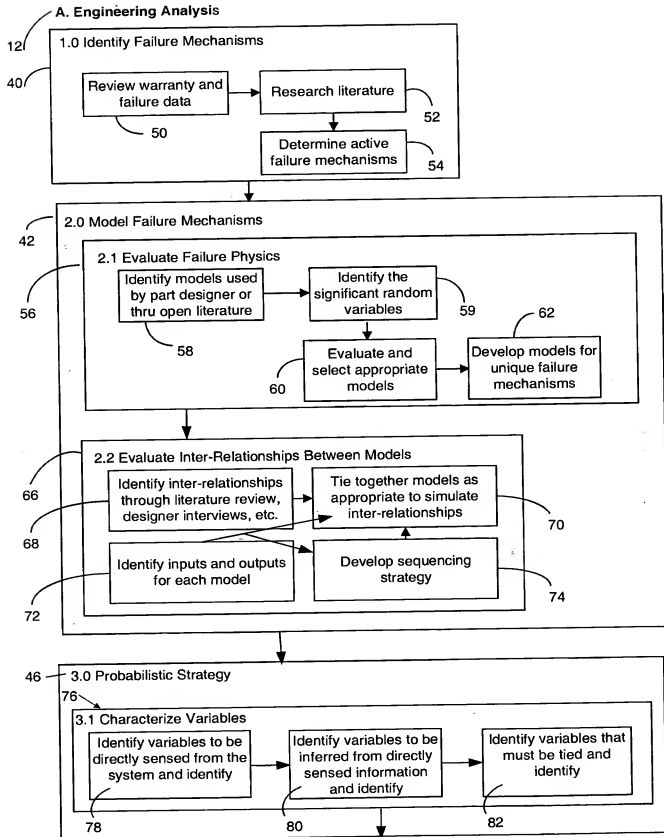
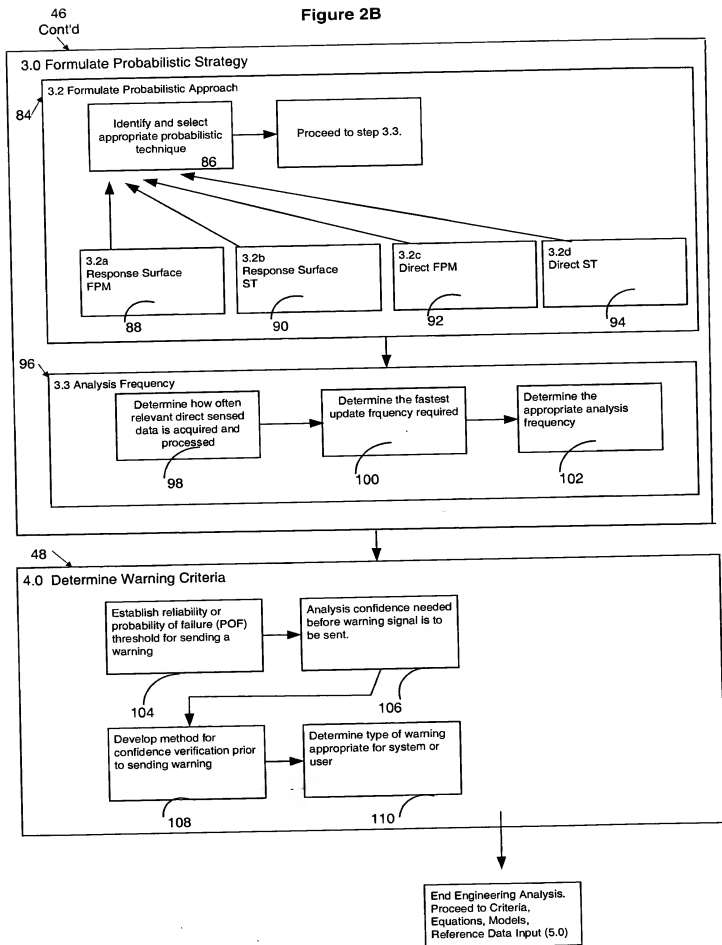


Figure 2A



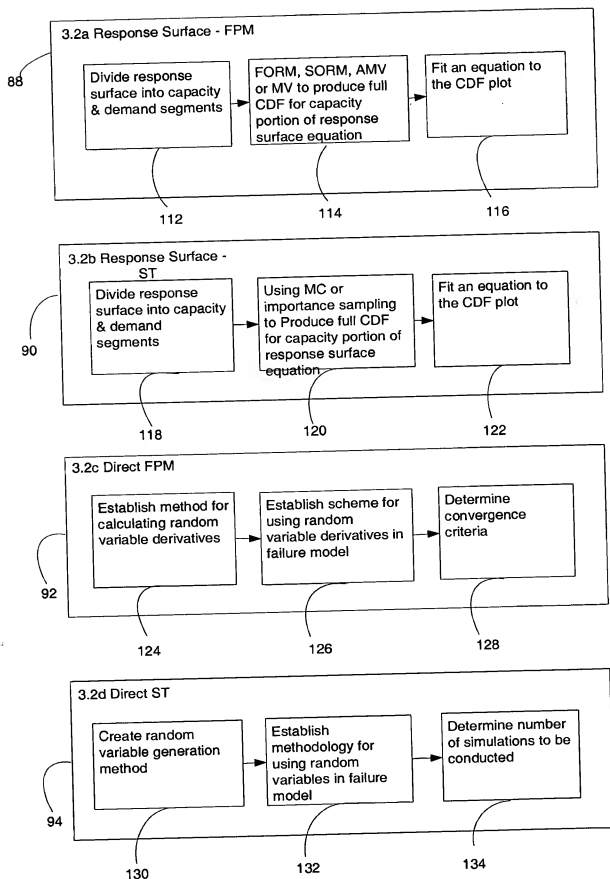
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Figure 2B



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FIGURE 2C



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Figure 2D

14

# 5.0 Criteria, Equations, Models, Reference Data Input

Program (software) or "burn-in" (chip) into memory device as appropriate criteria, equations, models, and reference data. 136

Proceed to Failure Prediction (B) 16

For probabilistic approach 3.2a and b (response surface FPM, or ST)

88 or 90

For probabilistic approach 3.2c (direct FPM)

92

For probabilistic approach 3.2d (direct ST)

94

Mapping strategy for each variable and response surface equation; statistical distribution of capacity portion of response surface equation; analysis frequency strategy and warning criteria.

138

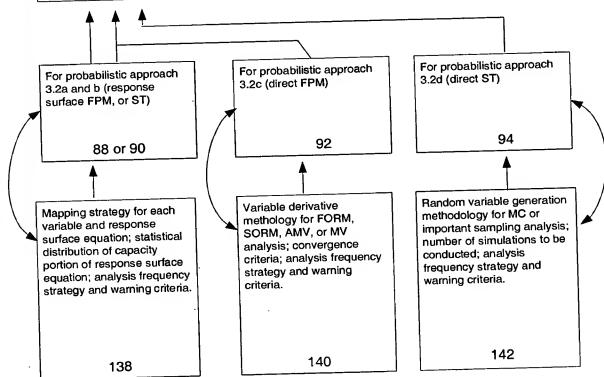
Variable derivative methodology for FORM, SORM, AMV, or MV analysis; convergence criteria; analysis frequency strategy and warning criteria.

140

Random variable generation methodology for MC or important sampling analysis; number of simulations to be conducted; analysis frequency strategy and warning criteria.

142

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**Figure 3A**

1.0 Central Processing (CPU)

18

1.1 Input data

25

Read operation and sensor data (from Overall System Computer Control) according to frequency strategy, and map data to appropriate variables.

30

1.2 Prediction Analysis

Use this process for  
Probabilistic Response  
Surface.

88, 90

Use this process for  
Probabilistic Direct FPM.

92

Use this process for  
Probabilistic Direct ST.

94

Calculate the "Demand"  
portion of the response  
surface.

146

Determine POF using  
FORM, SORM, AMV or MV.

152

Establish reliability or  
probability of failure (POF).  
Determine POF using MC  
or importance sampling.

156

Determine POF at Demand  
(using CDF equation)

148

Compare POF to  
exceedence criteria and  
verified per confidence  
criteria.

160

Follow appropriate warning  
criteria.

162

32

1.3 Output Data

Store variable readings,  
POF and selected warning  
criteria and warning  
information into memory  
device 34.

164

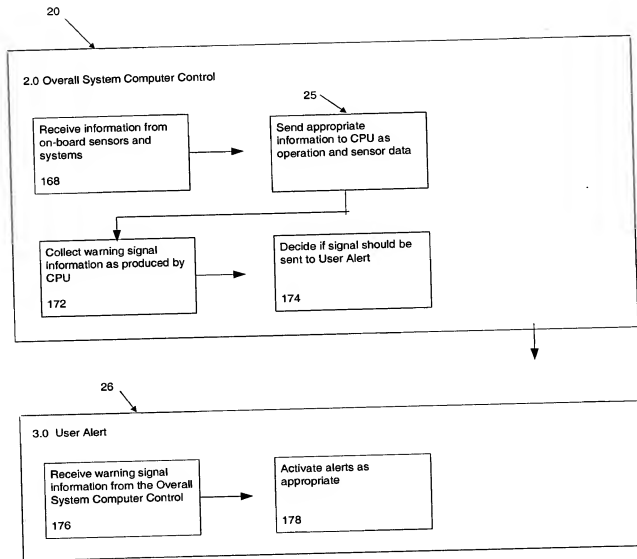
Communitate appropriate  
warning information to  
Overall System Computer  
Control.

166

Proceed to 174.

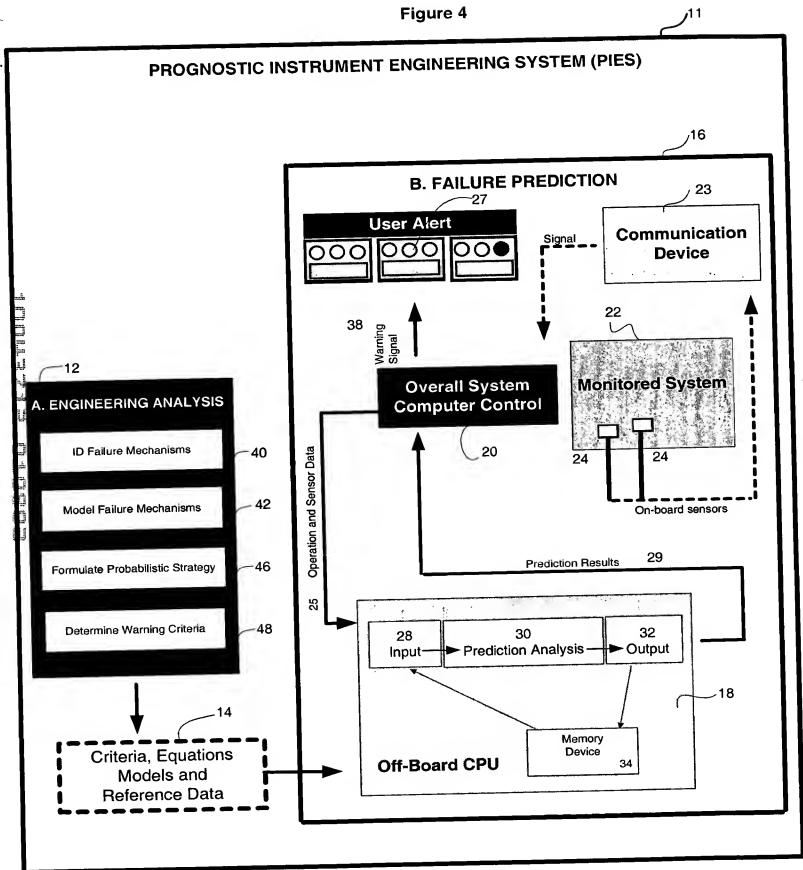
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Figure 3B



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Figure 4





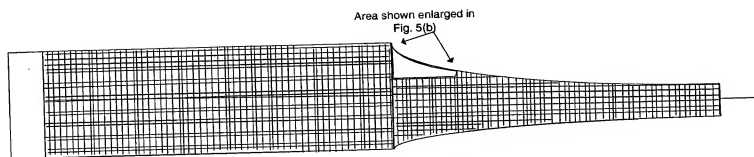


Figure 5(a)

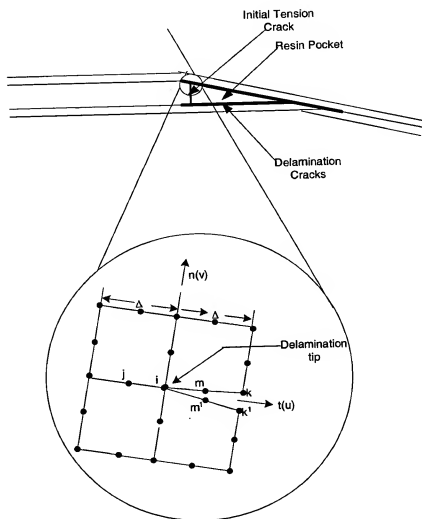


Figure 5(b)

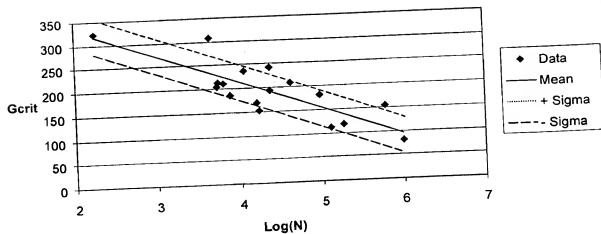


Figure 5(c)

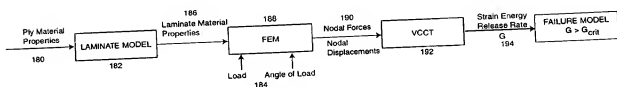


Figure 5(d)

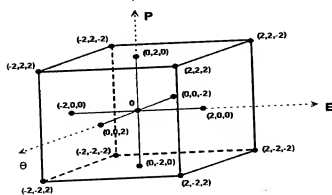


Figure 5(e)

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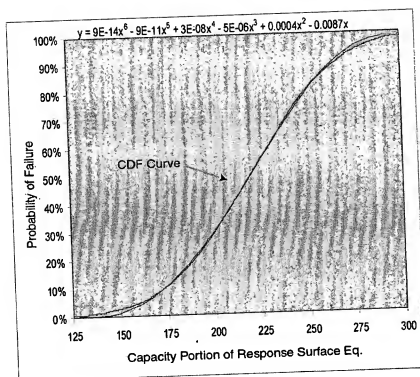


Figure 5(f)